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FINAL REPORT
CENTER OF EXCELLENCE IN MODEL-BASED HUMAN
PERFORMANCE

NCC 2-307-S26 PERIOD: 5/1/84 - 2/28/97

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Final Report: NCC 2-307-S26
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Impact

The Center of Excellence (COE) was created in 1984 to facilitate active collaboration between the scientists at Ames Research Center and the Stanford Psychology Department. As this document will review, over that period of time, the COE served its function well.

Funds from the Center supported a large number of projects over the last ten years. Many of the people who were supported by the Center have gone on to distinguished research careers in government, industry and university. In fact, several of the people currently working at NASA Ames were initially funded by the Center mechanism, which served as a useful vehicle for attracting top quality candidates and supporting their research efforts.

We are grateful for NASA's support over the years. As we reviewed in the reports for each year, the COE budget generally provided a portion of the true costs of the individual research projects. Hence, the funds from the COE were leveraged with funds from industry and other government agencies. In this way, we feel that all parties benefitted greatly from the collaborative spirit and interactive aspects of the COE. The portion of the support from NASA was particularly important in helping members of the COE to set aside the time to publish papers and communicate advances in our understanding of human performance in NASA-related missions.

Technical Accomplishments

The ten annual reports from this grant include a list of the specific papers that were written with support from the grant. The list of publications can be gathered from these annual reports that are already on record. So, rather than repeating that very long list here, it seems more useful to summarize

the impact of the COE by examining the overall pattern of contributions.

The main objective of the COE was to perform advanced research. One measure of our research contributions is to see note the number of papers were published in refereed scientific journals and the number of abstracts contributed to major conferences. This grant supported research that led to roughly 50 papers in distinguished journals (including the **Journal of the Optical Society of America**, **J. Neuroscience**, **Vision Research**, **Nature** and **Science**). In addition, more than 50 conference papers were delivered by the individuals supported by this grant.

The papers written from the groups of the senior investigators participating in this grant have achieved international prominence. For example, journal articles and conference proceedings from Ahumada, Kaiser, Stone and Watson at Ames, with support from this grant, are among the best-known and most widely cited contributions to the image compression and visual perception. Papers published by Heeger, Rumelhart, Shepard, and Wandell, also supported by this grant, have received very widespread attention in areas ranging from the mathematics of neural networks, the neural basis of vision, and various aspects of color imaging technology. The presence of this grant drew national attention to the high quality of perceptual research being carried out at Ames and Stanford.

A second, important measure of the scientific contribution of this grant is to review how the Center funds helped to launch the scientific careers of a large number of brilliant individual investigators. A fairly complete list of individuals who received support from the NASA grant is shown below. Several things can be learned from examining the list of individuals and their current affiliations.

First, the grant played a useful role in helping Dr. Ahumada and Dr. Watson and other members of the Ames Research Center to recruit talented post-doctoral fellows. Several of the post-doctoral fellows originally recruited through the COE continued to work at NASA for several years (e.g., Stone, Beutter, Perrone and others). Some of these individuals are now members of the technical staff and some are in management positions at Ames.

Second, the grant played a useful role in fostering the career of individuals who went on to work in industry. Dr. Farrell, Dr. Tiana, Dr. Samadani, and Dr. Pavel occupy management positions at industrial research labs. Their experience and training within the COE was helpful to them in their career development. Hence, the COE served as a means of training people

for important industrial positions in the digital imaging field, and fostered an industry-government-academia partnership that is often hard to achieve.

Third, the COE also had a national impact. Professor Nachmias (from Penn) is a member of the National Academy of Sciences and he participated in the Center for two years. Professor Pelli is a distinguished research scientist on the East Coast, and he too visited the Center. Professor Cowan is well known for his work in color technology, and he was a key participant at a conference organized by Ames on the issues of color display technologies in the cockpit. By serving as a mechanism to include scientists of national prominence, the center enriched the intellectual life of all participants and helped both the training function and to inspire new research directions that appeared in published journal articles.

Finally, the grant played a very helpful role in developing the research careers of many individuals who went on to join academia. Professor Brainard, Professor Perrone, Professor Heeger, Dr. Chichilnisky (Salk) and Professor Shiffrar were all supported while graduate students or post-docs by the COE. This is an extremely distinguished list of research scientists. As a group, they would form a leading powerful academic department. That the COE played an important role in training these scientists is perhaps the most important measure of the success of the program.

In conclusion, NASA should be proud of the important contribution made by supporting the activities of this Center of Excellence. The quality of the research, the training function, and the outcomes all suggest that the funds were invested wisely and will benefit both the scientific understanding of perception and the national agenda of training scientists and managers in computational human factors research.

NASA - MSFC TECHNOLOGY REPORT

1a NAME OF CONTRACTOR/ SUBCONTRACTOR STANFORD UNIVERSITY	c. CONTRACT NUMBER NCC 2-307-S26	2a. NAME OF GOVERNMENT PRIME CONTRACTOR NASA AMES RES CENTER	c. CONTRACT NUMBER NCC 2-307-S26	3 TYPE OF REPORT (check one) <input type="checkbox"/> INTERIM <input checked="" type="checkbox"/> FINAL
b ADDRESS (include Zip Code) DI.PT OF PSYCHOLOGY STANFORD, CA 94305-2130	d. AWARD DATE (YYMMDD) 5/1/84	b. ADDRESS (include Zip Code) MOFFETT FIELD, CA 94035	d. AWARD DATE (YYMMDD) 5/1/84	4 REPORTING PERIOD (YYMMDD) FROM 5/1/84 TO 2/28/97

SECTION I ☐ NEW TECHNOLOGY NFS 18-52:227-70

SECTION II ☐ PATENT RIGHTS FAR 18-52:227-11

5. "REPORTABLE ITEMS": (if "none" so state)	7. "SUBJECT INVENTIONS": (if "none" so state)
a. NAME OF INNOVATOR(S) (LAST, FIRST, M.I.)	a. NAME OF INNOVATOR(S) (LAST, FIRST, M.I.)
b. TITLE OF DISCLOSURE	b. TITLE OF DISCLOSURE

NONE

NONE

SECTION IA - SUBCONTRACTS (Containing a "Patent Rights" clause)

6. SUBCONTRACTS AWARDED BY CONTRACTOR/SUBCONTRACTOR. (if "none" so state)

a. NAME OF SUBCONTRACTORS	b. ADDRESS (include Zip Code)	c. SUBCONTRACT NO.(S)	d. DESCRIPTION OF WORK TO BE PERFORMED UNDER SUBCONTRACT(S)	e. SUBCONTRACT DATES (YYMMDD) AWARD EST. COMPL
NONE				

SECTION III - CERTIFICATION

8. CERTIFICATION OF REPORT BY CONTRACTOR/SUBCONTRACTOR

a. NAME OF AUTHORIZED CONTRACTOR/SUBCONTRACTOR OFFICIAL
(LAST, FIRST, M.I.)

WILLIAMS, PEGGY A.

b. TITLE

GRANTS OFFICER

c. I CERTIFY THAT THE CONTRACTOR HAS THE REQUIRED PROCEDURES FOR PROMPT IDENTIFICATION AND TIMELY DISCLOSURE OF (PLEASE CHECK) ☐ (REPORTABLE ITEMS) ☐ (SUBJECT INVENTIONS), AND THAT SUCH PROCEDURES HAVE BEEN FOLLOWED, AND THAT THIS REPORT IS COMPLETE AND ACCURATE.

SIGNATURE OF AUTHORIZED CONTRACTOR/SUBCONTRACTOR OFFICIAL

DATE (YYMMDD)

Individuals supported by the COE

J. Farrell (Hewlett-Packard Labs); D. Varner (Brooks Air Force Base); R. Shepard (Stanford); M. Pavel (ATT Labs); J. Perrone (New Zealand); A. Ahumada (NASA); A. Watson (NASA); D. Brainard (UC Santa Barbara); K. Nielsen (M.D.); D. Pelli (NYU); W. Cowan (U. Waterloo); J. Nachmias (U Penn.); M. Kaiser (NASA); E. Chichilnisky (Salk Institute); D. Rumelhart (Stanford); R. Remington (NASA); D. Heeger (Stanford); A. Poirson (Stanford); C. Tiana (FLIR Systems); M. Rosekind (Unknown); K. Mosier (Unknown); M. Shiffrar (Rutgers); C. Graeber (NASA); R. Samadani (EFI); B. Beutter (NASA); L. Stone (NASA); B. Wandell (Stanford)

NASA - MSFC TECHNOLOGY REPORT

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b. ADDRESS (include Zip Code) DEPT OF PSYCHOLOGY STANFORD, CA 94395-2130	d. AWARD DATE (YYMMDD) 5/01/84	b. ADDRESS (include Zip Code) MOFFETT FIELD, CA 94035-1000	4. REPORTING PERIOD (YYMMDD) FROM 5/1/84 TO 2/28/97

SECTION I ☐ NEW TECHNOLOGY NFS 18-52-227-70

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SECTION II ☐ PATENT RIGHTS FAR 18-52.227-11

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NONE			

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b. TITLE GRANTS OFFICER	
SIGNATURE OF AUTHORIZED CONTRACTOR/SUBCONTRACTOR OFFICIAL	DATE (YYMMDD)

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